



Spectral Gamma-Ray Borehole  
Log Data Report

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Borehole

21-06-05

Log Event A

### Borehole Information

Farm : <u>BX</u>	Tank : <u>BX-106</u>	Site Number : <u>299-E33-165</u>
N-Coord : <u>45,569</u>	W-Coord : <u>53,319</u>	TOC Elevation : <u>654.70</u>
Water Level, ft :	Date Drilled : <u>12/31/1971</u>	

### Casing Record

Type : <u>Steel-welded</u>	Thickness : <u>0.280</u>	ID, in. : <u>6</u>
Top Depth, ft. : <u>0</u>	Bottom Depth, ft. : <u>100</u>	

### Borehole Notes:

Borehole 21-06-05 was drilled in December 1971 to a depth of 100 ft with 6-in. casing. The casing thickness is presumed to be 0.280 in., on the basis of the published thickness for schedule-40, 6-in. steel tubing. Data from the drilling log and Chamness and Merz (1993) were used to provide construction information. Although no information concerning grouting or perforations was available, it is assumed that the borehole was not grouted or perforated since this was not a routine practice during the 1970s drilling campaign. The top of the casing, which is the zero reference for the SGLS, is about 0.5 ft below the ground surface.

### Equipment Information

Logging System : <u>1B</u>	Detector Type : <u>HPGe</u>	Detector Efficiency: <u>35.0 %</u>
Calibration Date : <u>02/1997</u>	Calibration Reference : <u>GJO-HAN-13</u>	Logging Procedure : <u>P-GJPO-1783</u>

### Log Run Information

Log Run Number : <u>1</u>	Log Run Date : <u>06/10/1997</u>	Logging Engineer: <u>Alan Pearson</u>
Start Depth, ft.: <u>99.5</u>	Counting Time, sec.: <u>100</u>	L/R : <u>L</u> Shield : <u>N</u>
Finish Depth, ft. : <u>40.0</u>	MSA Interval, ft. : <u>0.5</u>	Log Speed, ft/min.: <u>n/a</u>

Log Run Number : <u>2</u>	Log Run Date : <u>06/10/1997</u>	Logging Engineer: <u>Alan Pearson</u>
Start Depth, ft.: <u>41.0</u>	Counting Time, sec.: <u>100</u>	L/R : <u>R</u> Shield : <u>N</u>
Finish Depth, ft. : <u>37.0</u>	MSA Interval, ft. : <u>0.5</u>	Log Speed, ft/min.: <u>n/a</u>

Log Run Number : <u>3</u>	Log Run Date : <u>06/10/1997</u>	Logging Engineer: <u>Alan Pearson</u>
Start Depth, ft.: <u>38.0</u>	Counting Time, sec.: <u>100</u>	L/R : <u>L</u> Shield : <u>N</u>
Finish Depth, ft. : <u>35.0</u>	MSA Interval, ft. : <u>0.5</u>	Log Speed, ft/min.: <u>n/a</u>



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Log Run Number :	<u>4</u>	Log Run Date :	<u>06/11/1997</u>	Logging Engineer:	<u>Gary Lekvold</u>
Start Depth, ft.:	<u>0.0</u>	Counting Time, sec.:	<u>100</u>	L/R : <u>L</u>	Shield : <u>N</u>
Finish Depth, ft. :	<u>36.0</u>	MSA Interval, ft. :	<u>0.5</u>	Log Speed, ft/min.:	<u>n/a</u>



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## Analysis Information

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Analyst : E. Larsen

Data Processing Reference : MAC-VZCP 1.7.9

Analysis Date : 12/03/1997

### Analysis Notes :

This borehole was logged by the SGLS in four log runs. High count rates and increasing dead time (greater than 20 percent) were encountered during log run one at a depth of 40 ft. As a result, log run two was logged in real time from 41 to 37 ft. Log runs three and four were logged in live time from 38 ft to the ground surface, after the count rates and dead time decreased.

The pre-survey and post-survey field verification spectra for all logging runs met the acceptance criteria established for peak shape and system efficiency. The energy calibration and peak-shape calibration from these spectra were used to establish the peak resolution and channel-to-energy parameters used in processing the spectra acquired during the logging operation.

Casing correction factors for a 0.280-in.-thick steel casing were applied during analysis.

The man-made radionuclides Cs-137, Sb-125, U-235, and U-238 were detected in this borehole. The Cs-137 contamination was detected continuously from the ground surface to 19 ft and nearly continuously from 24 to 49.5 ft. An isolated occurrence of Cs-137 was detected from 77.5 to 78 ft. The Sb-125 contamination was detected between 41 and 42 ft. U-235 contamination was detected at 42 ft and continuously from 48 to 55 ft. The U-238 contamination was measured nearly continuously from 41 to 43.5 ft and 48 to 55 ft.

An analysis of the shape factors associated with applicable segments of the spectra was performed. The shape factors provide insights into the distribution of the Cs-137 contamination and into the nature of zones of elevated total count gamma-ray activity not attributable to gamma-emitting radionuclides.

The K-40 concentration values increase from 39.5 to 41 ft, increase again from 42.5 to 45 ft, and remain elevated to the bottom of the logged interval (99.5 ft). Relatively higher U-238 concentrations occur below about 35 ft. The U-238 concentration values are absent between 37 and 40.5 ft.

Additional information and interpretations of log data are included in the main body of the Tank Summary Data Report for tank BX-106.

### Log Plot Notes:

Separate log plots show the man-made and the naturally occurring radionuclides. The natural radionuclides can be used for lithology interpretations. The headings of the plots identify the specific gamma rays used to calculate the concentrations. Uncertainty bars on the plots show the statistical uncertainties for the measurements as 95-percent confidence intervals. Open circles on the plots give the MDL. The MDL of a radionuclide represents the lowest concentration at which positive identification of a gamma-ray peak is statistically defensible.

A combination plot includes the man-made and natural radionuclides, the total gamma derived from the spectral data, and the Tank Farms gross gamma log. The gross gamma plot displays the latest available digital data. No attempt has been made to adjust the depths of the gross gamma logs to coincide with the SGLS data.



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Plots of the spectrum shape factors are included. The plots are used as an interpretive tool to help determine the radial distribution of man-made contaminants around the borehole. A plot of representative historical gross gamma-ray logs is also included.